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ABSTRACT

Researchers have demonstrated that particular careers attract individuals with distinct identifiable personality profiles and learning styles, and this idea is extended to the selection of majors within the College of Business and Public Administration (BPA) at the University of North Dakota. The Myers-Briggs Type Indicator (MBTI) was used both to explain and predict selection of majors within the BPA. This instrument was administered to 430 junior and senior students in the BPA. A discriminant analysis was used to identify personality profiles and learning styles of majors in accounting, aviation, banking and finance, information management, management, and marketing. An analysis of the data looks at sample descriptors, MBTI personality profiles, and discriminant analysis (of six BPA majors, four BPA groups or majors, and three BPA groups or majors). Study results indicate that significant differences seem to exist between students majoring in accounting, aviation, and information, but banking and finance students do not seem to differ much from accounting majors. The quantitative discriminant analysis did not yield identifiable profiles for management and marketing majors. Identification of student and instructor personality profiles or learning styles may significantly improve educational delivery systems. Nine tables are included. Contains 23 references. (Author/SM)

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A DISCRIMINANT ANALYSIS OF MAJORS IN THE COLLEGE OF BUSINESS AND PUBLIC ADMINISTRATION AT THE UNIVERSITY OF NORTH DAKOTA

by
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June 1988

ABSTRACT

Researchers have demonstrated that particular careers attract individuals with distinct identifiable personality profiles and learning styles. This study extends this idea to the selection of majors within the College of Business and Public Administration (BPA).

The Myers-Briggs Type Indicator (MBTI) was used both to explain and predict selection of majors within the BPA. The MBTI instrument was administered to 430 junior and senior students in the BPA, which yielded a total of 395 usable response sets for six majors. A discriminant analysis was used to identify personality profiles and learning styles of majors in Accounting, Aviation, Banking and Finance, Information Management, Management, and Marketing. The study indicated that the MBTI scores discriminated reasonably well between some of the majors, but the value of MBTI scores or types as predictors appeared limited.

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INTRODUCTION

Historically teachers and researchers in education have focused on course and program contents for particular careers. Teaching evaluation instruments seek to assess how well instructors assist students in acquiring the knowledge embodied in specific courses. While most teachers recognize that students differ in their preferred mode of learning, explicit consideration of different learning styles is relatively uncommon.

Most instructors would probably agree that students differ across majors in the College of Business and Public Administration (BPA). Some students enjoy the structured and sequential content of accounting courses, while enjoying less the holistic management courses. Other students may prefer hands-on computer courses over either accounting or management. The general assertion that students differ across majors will be examined formally in this study.

The goal of this research was to develop personality profiles of students in various BPA majors for the purpose of identifying personality profiles and indirectly preferred learning styles. The Myers-Briggs Type Indicator (MBTI) was used to identify these personality profiles. This instrument has been used successfully to identify occupational preferences. Rezler and Buckley (1977) identified personality profiles of female students in the health care field. Miller (1967) found that law schools enrolled particular personality types. Goldschmid (1967) successfully related personality types to the selection of college majors.

Students attracted to programs in business schools represent a more

homogeneous group than college students at large. Identification of personality profiles of students in majors within business schools is, therefore, more difficult. Expected intra-college differences between majors are probably smaller than the differences between college majors. No study was found exploring differences between majors within the field of business. This study is exploratory, because any a priori grouping by majors may be too detailed. For example, it may be possible to identify probable Accounting majors and non-accounting majors, but not possible to distinguish between Management and Marketing majors.

REVIEW OF RELATED LITERATURE

The topology developed by Carl Jung (1923), made operational through the MBTI instrument, may be viewed as the forerunner to more recently developed instruments designed to identify preferred learning styles. The MBTI instrument contains four scales:

Extraversion - Introversion (EI)
Sensing - Intuition (SN)
Thinking - Feeling (TF)
Judging - Perceiving (JP)

Myers (1962) indicated that the EI dimension reflects how an individual directs his perceptions and judgment upon the external world. An extravert or E-type person focuses on people and things, while an introvert or I-type is oriented toward concepts and ideas.

The SN dimension measures two modes of perception. Some individuals become aware of their environment through the process of sensing (S-types), using one or more of their five senses. N-type individuals perceive through the process of intuition, "which is understood as indirect perception by way of the unconscious, with emphasis on ideas or associations which the unconscious tacks on to the

outside things perceived" (Myers 1962, p. 2).

The TF dimension identifies a person's preferred mode of judging. A thinking (T-type) person "discriminates impersonally between true and false," while a feeling (F-type) person relies "primarily upon feeling, which discriminates between valued and non-valued" (Myers 1962, p. 2).

The JP dimension focuses on how a person comes to closure or reaches a decision. A judging (J-type) person wants to reach a conclusion based on available information. A perceptive (P-type) individual searches for more information, tends to postpone decisions, is flexible, tolerant, and adaptable to change (Myers 1962).

Each of these four scales may be interpreted as a dichotomous categorical variable. These four scales, therefore, yield a total of sixteen personality types. From the perspective of learning styles, the SN and TF scales are of particular interest. Viewed in isolation, they generate four personality types or learning styles, ST, SF, NT and NF.

These four personality or learning styles have also been interpreted as preferred approaches to problem-solving (Hellriegel and Slocum 1975):

Sensing-Thinking (ST) Types	-- prefer reasoning from cause to effect -- practical and matter-of-fact -- prefer well defined rules and bureaucracies -- realistic with short-term goals
Sensing-Feeling (SF) Types	-- interested in facts that can be verified directly by the senses -- more interested in facts about people -- prefer well defined hierarchies and rules -- enjoy open communication
Intuitive-Thinking (NT) Types	-- impersonal focus on possibilities -- enjoy theoretical and technical analyses -- prefer long-term perspective -- conceptualize problems

Intuitive-Feeling (NF) Types -- focus on possibilities
-- avoid specific and focus on broad themes
-- need to serve personal and social needs
-- prefer decentralized organizational structures

Kern and Matta (1987) explored how these four learning styles had an impact on learning in self-paced, computer-assisted instruction (CAI) involving Lotus 1-2-3. The NT group scored sigificantly higher on competency examinations than the average student in the program. The opposite type, SF, scored significantly lower than the average student on the same examinations. The SF types prefer interpersonal interaction, which the CAI did not provide. The SN and TF types did not perform significantly higher or lower on the competency examinations than the average student in the group.

David Kolb (1976) proposed that learning be viewed as a four-stage cycle. He defined the four stages as follows:

Concrete Experience (CE)
Reflective Observation (RO)
Abstract Conceptualization (AC)
Active Experimentation (AE)

These four cyclical stages were then collapsed into two bi-polar dimensions, the active/reflective and concrete/abstract dimensions. Viewed as dichotomies or type classifications, four learning styles result that resemble the four MBTI types based on the SN and TF scales. Kolb described these learning styles as follows:

Accommodators -- like doing things
-- risk takers
-- discard theory if it does not fit facts
-- at ease with people
-- found in technical or practical fields
-- found in marketing and sales

Assimilators -- like theoretical models and abstract reasoning
-- excel in inductive reasoning
-- less interested in people
-- less concerned about practical applications
-- found in basic sciences and mathematics
-- found in research and planning department

Divergers -- view concrete experience from many perspectives
-- search for patterns and structure
-- interested in people
-- like brainstorming sessions
-- found among personnel managers and counselors

Convergers -- like single correct answer or solution
-- like to deal with things rather than people
-- tend to be relatively unemotional
-- like active experimentation
-- found in the physical sciences
-- style is characteristic of engineers

Kolb developed the learning style indicator (LSI), an instrument designed to classify persons into one of these four groups. The validity and reliability of the LSI instrument has been questioned by Freedman and Stumpf (1980).

Mumford (1987) developed a similar instrument to identify learning styles, the learning style questionnaire (LSQ). He identified four learning styles described as follows:

Activists -- enjoy a wide variety of activities
Reflectors -- want time to consider, assimilate and prepare
Theorists -- want clear structure and purpose
Pragmatists -- want focus on real current problems and action plans

The relative usefulness of these two instruments has not yet been researched.

The similarity of types or learning styles described using the MBTI and LSI instruments were investigated by Lewis and Margerison (1977). They found a strong correlation between the SN scale and Kolb's concrete experience - abstract conceptualization scale. However, the latter scale captured not only the SN dimension but also some of the TF dimension.

METHODOLOGY

The MBTI instrument was administered to junior and senior classes in the Fall Semester of 1986 and in the Fall and Spring Semesters of 1987. A total of 395 response sets were used in this study, collected from majors in Accounting, Aviation, Banking and Finance, Information Management, Management, and Marketing. Both Marketing and Aviation offer multiple majors. All Aviation related majors within the BPA were considered one group. Likewise, all Marketing majors were treated as one group. One question was included to provide some evidence on the degree to which students were satisfied with their selected majors.

The Office of the Registrar supplied data on grade point averages for the sample according to the following specifications.

GPA1 -- GPA in all 100 and 200 level courses completed by students

GPA2 -- GPA in all 300 and 400 level courses offered by BPA and completed by students

GPA3 -- GPA in Acct 200, 201, 217; Econ 201, 202, 210; Mgmt 300, 301, 475; Mrkt 301; Fin 310; Math 104, 204; Engl 101, 102 or 209; Comm 161

GPA4 -- GPA in all 300 and 400 level courses offered by BPA except Mgmt 300, 301, 475; Fin 310; Mrkt 301

GPA5 -- GPA for all completed courses offered by BPA

GPA6 -- GPA for all completed courses taken by students in the sample.

GPA1 may be useful if personality profiles were used to advise students in the selection of majors. Overall BPA grade point averages were measured by GPA2. Grade point averages in required business courses and foundation courses were measured by GPA3. GPA4 is a proxy for grade point averages in selected majors. GPA5 is broader in scope than GPA2, because it includes all BPA courses, not just 300 and 400 level BPA courses. The overall grade point average was measured by GPA6.

It was expected that GPAs would explain a significant fraction of the variance

associated with selection of majors. In addition, students may be attracted to particular majors because of relatively high grade point averages in these majors.

The data analysis is divided into two parts. Sample descriptors and non-statistical personality profiles are presented in the first part of the analysis. A discriminant analysis was used to explore the feasibility of predictive selection of majors based on MBTI scores and grade point averages. The SPSS statistical system was used to process the data.

ANALYSIS OF DATA

This section is divided into three parts: 1) sample descriptors, 2) MBTI personality profiles, and 3) discriminant analysis. The sample descriptors and MBTI personality profiles provide qualitative information about various majors.

Sample Descriptors

Table 1 shows classifications of majors by sex, year in school, and preference scores.

TABLE 1

SAMPLE DESCRIPTORS AND PREFERENCES

Major	Sex			Year in School		Preference Score		
	Males	Females	Total	Juniors	Seniors	High	Medium	Low
Accounting	37	29	66	16	50	36	26	4
Aviation	56	10	66	34	32	54	11	1
Banking and Finance	43	23	66	20	46	41	23	2
Information Management	11	55	66	24	42	52	14	0
Management	47	19	66	4	62	35	30	1
Marketing	32	34	66	24	42	49	17	0

Aviation, Information Management, and Marketing students seem strongly committed to the majors offered by the respective departments. Aviation and Information Management majors concentrate on how to perform specific tasks, such as flying or manipulating data using computers.

Means and standard deviations for the six grade point averages are shown in Table 2. GPA1 and GPA3 may be interpreted as indicators of students' scholastic

TABLE 2

DESCRIPTIVE GPA STATISTICS FOR SIX MAJORS IN BPA

Major	GPA1 M	GPA1 SD	GPA2 M	GPA2 SD	GPA3 M	GPA3 SD	GPA4 M	GPA4 SD	GPA5 M	GPA5 SD	GPA6 M	GPA6 SD	$\frac{GPA4}{GPA1}$ M	$\frac{GPA4}{GPA3}$ M
Accounting	3.20	.55	2.89	.63	3.15	.56	2.78	.68	2.95	.60	3.04	.58	.87	.88
Aviation	2.71	.53	2.64	.54	2.58	.59	2.58	.58	2.44	.57	2.82	.47	.95	1.02
Banking and Finance	3.15	.56	2.93	.73	3.10	.63	2.89	.73	2.93	.68	3.03	.60	.94	.93
Information Management	2.73	.56	3.00	.58	2.52	.60	3.14	.60	2.78	.56	2.84	.51	1.15	1.25
Management	2.77	.51	2.84	.50	2.60	.60	2.92	.50	2.75	.49	2.82	.45	1.05	1.12
Marketing	2.71	.48	2.85	.49	2.62	.50	2.90	.54	2.66	.50	2.78	.42	1.07	1.11

TABLE 3

MBTI PERSONALITY PROFILE CLASSIFICATIONS: PERCENTAGE DISTRIBUTIONS

MBTI Types	Accounting	Aviation	Banking and Finance	Information Management	Management	Marketing
ESTJ	24.3	19.8	13.7	25.9	19.9	15.3
ESTP	1.5	10.6	10.6	3.0	13.7	10.6
ESFJ	9.1	3.0	7.6	21.2	4.5	9.1
ESF	3.0	3.0	1.5	3.0	3.0	1.5
ENTJ	4.5	4.5	7.6	0.0	3.0	7.6
ENTP	7.6	1.5	4.5	0.0	6.1	6.1
ENFJ	6.1	1.5	1.5	3.0	3.0	6.1
ENFP	1.5	6.1	6.1	0.0	3.0	12.1
ISTJ	9.1	16.8	21.2	10.6	21.2	12.1
ISTP	4.5	13.6	7.6	3.0	9.1	0.0
ISFJ	10.7	4.5	4.5	16.8	3.0	3.0
ISFP	1.5	7.6	0.0	1.5	0.0	4.5
INTJ	1.5	1.5	1.5	4.5	3.0	1.5
INTP	12.1	4.5	10.6	4.5	3.0	4.5
INFJ	3.0	0.0	0.0	3.0	0.0	1.5
INFP	0.0	1.5	1.5	0.0	4.5	4.5
TOTALS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

ability. Accounting and Banking and Finance students score significantly higher on GPA1 and GPA3 than students in other majors.

Two ratios, GPA4/GPA1 and GPA4/GPA3, were calculated as indices of grading policy within each major. Accounting faculty appeared to apply the most rigorous grading standard, while Information Management faculty seemed to use the most liberal grading standard. Students without strong preferences may select majors in departments with liberal grading standards.

MBTI Personality Profiles

Table 3 shows frequencies for the sixteen MBTI types, classified by major. Detailed descriptions of these personality types are found in Myers (1962) and Keirsey and Bates (1984).

TABLE 4
MBTI CLASSIFICATIONS: TF AND SN SCALES

Major	Percentage Distributions ST	SF	NT	NF
Accounting	39.4	24.2	25.8	10.6
Aviation	60.6	18.2	12.1	9.1
Banking and Finance	53.0	13.6	24.2	9.2
Information Management	42.4	42.4	9.1	6.1
Management	63.6	10.6	15.2	10.6
Marketing	37.9	18.2	19.7	24.2

Table 4 classifications were derived by summing over the EI and JP scales. Both the Accounting and Banking and Finance majors contained a relatively large percentage of NT types, typically associated with high scholastic achievement. Aviation and Management majors were predominantly ST types. Information Management attracted ST and SF types, which was offset by low frequencies for NT and NF types.

DISCRIMINANT ANALYSIS

A discriminant analysis was initially completed for the six majors and each GPA index. Because some majors may attract very similar type students, the analysis was repeated with four groups. Accounting and Banking and Finance were combined into one group. Marketing and Management majors represented another group. Finally, Accounting majors were treated as one group, Aviation majors as a second group, and all other majors as a third group.

Discriminant Analysis of Six BPA Majors

The correlation matrix generated by the SPSS DISCRIMINANT procedure showed a 0.47 correlation between the JP and SN scales. This was consistent with the findings of other researchers. All other correlation coefficients were below 0.16. The univariate F-tests showed that all variables, viewed individually, were significant at the 5 percent level, except for the EI variable.

The first three discriminant functions were significant at the five percent level of significance for each GPA index. GPA1 was used as the primary grade point average measure, because most students had completed all 100 and 200 level courses. Futhermore, for predictive purposes, GPA1 would be available when students select their majors.

Standardized canonical discriminant function coefficients for GPA1 are shown in Table 5. In the first function, the GPA1 and TF scales contributed most to the explained variance. The TF and JP scales contributed most to the explained variance in the second function. The three significant functions explained 94.06 percent of total variance.

TABLE 5

STANDARDIZED CANONCIAL DISCRIMINANT FUNCTION COEFFICIENTS

Variables	Function 1	Function 2	Function 3
ET	0.03131	0.12903	0.62554
SN	0.15660	0.04959	0.69522
TF	0.39943	0.62253	0.10704
JP	0.31053	0.69612	0.09338
GPA1	0.94198	0.37969	0.01342

The DISCRIMINANT procedure correctly classified 30.89 percent of the 395 cases. Prior probabilities were explored, but classifications did not improve. Table 6 shows the actual and predicted group memberships. Classification errors were large for Banking and Finance and Management majors. The model predicted best for Information Management majors, followed by Accounting majors.

TABLE 6

ACTUAL AND PREDICTED GROUP MEMBERSHIP: SIX GROUPS

Actual Group		Predicted Group Membership 1	2	3	4	5	6
Accounting	1	23	3	13	14	6	7
		34.8%	4.5%	19.7%	21.2%	9.1%	10.6%
Aviation	2	5	20	10	12	9	10
		7.6%	30.3%	15.2%	18.2%	13.6%	15.2%
Banking and Finance	3	19	8	13	9	10	7
		28.8%	12.1%	19.7%	13.6%	15.2%	10.6%
Information Management	4	11	5	4	33	6	6
		16.9%	7.7%	6.2%	50.8%	9.2%	9.2%
Management	5	6	17	10	9	15	9
		9.1%	25.8%	15.2%	13.6%	22.7%	13.6%
Marketing	6	8	11	7	13	9	18
		12.1%	16.7%	10.6%	19.7%	13.6%	27.3%

Discriminant Analysis of Four BPA Groups or Majors

Based on the observed similarity of MBTI profiles and grade point averages for Accounting and Banking and Finance majors, these two majors were combined into one group. In addition, 28.8 percent of the Banking and Finance majors were incorrectly classified as Accounting majors, while only 19.7 percent of the Banking and Finance majors were correctly classified.

Both MBTI profiles and grade point averages were similar for Management and Marketing majors. Correctly classified percentages were low for these two majors with no apparent pattern. Therefore, these two majors were combined into one group. Aviation and Information Management majors were retained as distinct groups due to high percentages of correct classifications.

Except for the JP versus SN correlation of 0.47, all correlations were less than 0.17. All three canonical functions were significant, and by definition accounted for 100 percent of the variance. The univariate F-tests indicated that all variables were significant at the five percent level. GPA1 was used in this analysis.

Table 7 shows the standardized canonical discriminant function coefficients. GPA1 explained the largest fraction of the variance in the first function, followed by the TF variable. In the second function the JP and TF variables had the largest weights.

TABLE 7

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

Variables	Function 1	Function 2	Function 3
EI	0.07627	0.08221	0.65394
SN	0.17877	0.09246	0.74997
TF	0.22404	0.55928	0.07655
JP	0.19596	0.78574	0.43021
GPA1	0.99852	0.19743	0.03606

The classification of majors or groups is shown in Table 8. The Accounting and Banking and Finance group was correctly classified for about 45.5 percent of the cases. This compared to about 35 percent and 20 percent correct classifications, respectively, when identified as individual majors. Aviation majors were correctly classified in 37.9 percent of the cases. Information Management majors were classified correctly in 64.6 percent of the cases. In the Management and Marketing group, 26.5 percent of the cases were correctly

classified. This percentage does not differ significantly from the three incorrect classifications. Overall, 41.01 percent of the cases were correctly classified.

TABLE 8

ACTUAL AND PREDICTED GROUP MEMBERSHIP: FOUR GROUPS

Actual Group	Predicted Group Membership 1	2	3	4
Accounting and Banking and Finance	60 45.5%	22 16.7%	19 14.4%	31 23.5%
Aviation	13 19.7%	25 37.9%	14 21.2%	14 21.2%
Information Management	9 13.8%	6 9.2%	42 64.6%	8 12.3%
Management and Marketing	31 23.5%	35 26.5%	31 23.5%	35 26.5%

Discriminant Analysis of Three BPA Groups or Majors

Accounting and Aviation majors were left intact as distinct groups in this analysis. All other majors were combined into one group. This classification was based on substantive considerations, and the results of the analysis for six and four groups. GPA1 was used in this analysis.

All correlation coefficients were less than 0.22. Only one discriminant function was significant at the 5 percent level. This function explained 82.39 percent of the variance. The GPA1 and JP variables were most influential.

The actual and predicted classifications for the three groups are presented in Table 9. Accounting majors were correctly classified in 54.5 percent of the cases, while Aviation majors were correctly classified in 60.6 percent of the

cases. The third group (Others) shows almost equal frequencies for each group. In total, 41.77 percent of the cases were correctly classified.

TABLE 9

ACTUAL AND PREDICTED GROUP MEMBERSHIP; THREE GROUPS

Actual Group		Predicted Group Membership 1	2	3
Accounting	1	36	10	20
		54.5%	15.2%	30.3%
Aviation	2	11	40	15
		16.7%	60.6%	22.7%
Others	3	86	88	89
		32.7%	33.5%	33.8%

CROSS VALIDATION

Discriminant analysis is a mathematical maximization procedure with opportunity for capitalization on chance. The results generated using one sample may not replicate on other samples (Stevens 1986). Both the standardized coefficients and correlations tend to be unstable with small samples. In this particular application, the ratio of the total sample size to the number of variables was approximately eighty. Ratios in excess of forty were considered adequate by Stevens.

A holdout sample was generated by randomly selecting one-half of the observations from each major. The DISCRIMINANT procedure was run on the remaining one-half of the sample. Fisher's linear discriminant functions were used to obtain classifications for the holdout sample.

The reduction in the percentage of correctly classified cases was modest. The classification percentage dropped from 31.31 percent to 26.42 percent when each major was treated as a group. The correct classifications in the four-group analysis dropped from 40.54 percent to 36.54 percent, and the correct classifications dropped from 46.46 percent to 33.22 percent in the three-group analysis.

SUMMARY AND CONCLUSIONS

This study demonstrated that significant differences seem to exist between students majoring in Accounting, Aviation, and Information Management. Banking and Finance students do not seem to differ significantly from Accounting majors. The quantitative discriminant analysis did not yield identifiable profiles for Management and Marketing majors. Students electing Management as a major may not yet have identified their career goals. The Marketing major classification included three different majors offered by the Marketing Department, each of which may attract students with different personality profiles or learning styles.

Students classified according to majors in the BPA may be described as follows:

Accounting Major
- -- attracts students with the highest GPAs in the BPA, as measured by GPAl
- -- attracts more NT-types than other majors, i.e., students who prefer impersonal and theoretical conceptualization of problems
- -- students have a moderate commitment to the selected major

Aviation Major	-- attracts students with lower than average GPAs in the BPA, as measured by GPAI -- attracts more ST-types than most other majors, i.e., students who prefer practical and realistic approaches to problem-solving with well defined rules -- students have a very strong commitment to the selected major
Banking and Finance Major	-- attracts students with higher than average GPAs in the BPA, as measured GPAI -- attracts a relatively large number of NT- and St-types, i.e., students who prefer a combination of theory and application, but without a strong emphasis on people -- students have a moderately strong commitment to the selected major
Information Management Major	-- attracts students with lower than average GPAs in the BPA, as measured by GPAI -- attracts more SF-types than other majors, i.e., students who prefer facts and open communication with an emphasis on people rather than things -- students have a strong commitment to the selected major
Management Major	-- attracts students with lower than average GPAs in the BPA, as measured by GPAI -- attracts more ST-types than other majors in BPA, i.e., students who prefer practical and realistic approaches to problem-solving with well defined rules -- students have the weakest commitment to the selected major
Marketing Major	-- attracts students with lower than average GPAs in the BPA, as measured by GPAI -- attracts more NF-types than other majors, i.e., students who prefer to focus on broad themes and possibilities with an emphasis on people rather than things -- students have a strong committment to the selected major

Identification of student and instructor personality profiles or learning styles may significantly improve educational delivery systems. Individual instructors should consider student learning styles when selecting methods of instruction. The availability of student learning styles would be helpful to

instruction. The availability of student learning styles would be helpful to advisors, both when guiding students in the selection of majors and during career counseling.

This study focused on the use of the MBTI instrument to identify learning styles. Future studies should consider other similar instruments such as the LSI and the LSQ. Studying students who have changed their majors may yield additional insights. The Center for Aerospace Science at UND is currently attempting to match student and instructor learning styles through the use of the MBTI instrument. A similar procedure may be appropriate for BPA.

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